



WISCONSIN ASPHALT NEWS

ASPHALT. Wisconsin rides on us.

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Calendar of Events

- Oct. 19 Madison
Transportation Development Association (TDA) of Wisconsin **2010 Annual Meeting**
- Nov. 10-12 Lake Geneva
American Public Works Association (APWA) Wisconsin Chapter **2010 Fall Conference**
- Nov. 30-Dec. 1 Wisconsin Dells 2010 Annual WAPA Conference**
- Jan. 10-12, 2011 Wisconsin Dells
Wisconsin County Highway Association (WCHA) **2011 Winter Highway Conference**
- Jan. 19-20 Middleton
Wisconsin Transportation Builders Association (WTBA) **2011 Contractor-Engineer Conference**
- Feb. 6-9 Orlando, Fla.
National Asphalt Pavement Association (NAPA) **56th Annual Meeting**
- March 27-30 Tampa, Fla.
Association of Asphalt Paving Technologists (AAPT) **86th Annual Meeting**

Tools of the Trade Deflectometers and Penetrometers 101



The hard way to learn about a weak subgrade or base. (Image courtesy of Transtec Group)

WAPA members have always stood by the quality of their work. And now, with the growing interest in design-build pavement projects that include long-term warranties, standing by a paving job has taken on a new dimension. When contractors are on the hook to “make it right” for years after a project is completed, the need for tools that ensure the very best in pavement quality and durability is greater than ever.

It’s not always easy. Problems with weak subgrades can be difficult to detect with traditional testing methods. And though the undoing of a warranted pavement might be the subgrade,

that undoing manifests as a failure at the surface. Any contractor can tell you who will be blamed for *that*.

Fortunately, the tools are available to help contractors deliver on the promise of quality. In our last issue we wrote about **intelligent compaction**, a system that measures subgrade or pavement stiffness by measuring the bounce of the paving roller.

Several other devices in use in neighboring states and widely tested by researchers here in Wisconsin can help pavement engineers assess a subgrade and make more informed decisions on when to strengthen or stabilize it before constructing a pavement surface.

These devices are deflectometers—both the heavier-duty Falling Weight Deflectometer and the Light Weight Deflectometer—and the Dynamic Cone Penetrometer.

Professor Jim Crovetti of Marquette University is an expert on these devices and has studied their use at length. Crovetti tells us, “The FWD, LWD and DCP all provide a direct measure of the structural capacity of the soil. As a

result, they give a good picture of what might need to be corrected prior to paving.”

They are certainly better than simple visual inspection

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Mark Your Calendar WAPA'S ANNUAL CONFERENCE HEADS NORTH

WAPA will host its 51st annual conference November 30 and December 1 at the **Chula Vista Resort** in the Wisconsin Dells. We look forward to presenting the latest technical and industry developments and networking with everyone in this change of scenery. For exhibitor or sponsor opportunities, or to learn how to register online, visit the [conference Web page](#).



Deflectometers and Penetrometers 101

from page 1

and soil classification. They are also a cut above nuclear density testing, which only measures density rather than stiffness and strength. (Add to nuclear density testing’s drawbacks the headaches associated with using nuclear materials: costly and time-consuming storage, training, badging and certification.)

Deflectometers and penetrometers directly determine strength by applying a load to the surface and measuring the response of the ground or structure underfoot. The devices operate a bit differently from one another, and each

has its advantages. (See the table below for details.)




The Minnesota Department of Transportation makes considerable use of these devices and has a robust LWD specification as [detailed on Mn/DOT’s website](#). Mn/DOT’s John Siekmeier pointed out the varying costs in the different technologies: The FWD is an order of magnitude costlier to own than the LWD, which is in turn that much costlier than the DCP.

“I would think for a consulting engineer, it would make sense to use these in some combination,” says Siekmeier. “For example, you can quickly get several readings with a DCP and then bring in a deflectometer for those questionable areas that require more

detailed understanding before paving.”

Crovetti agrees with the need for this kind of pre-engineering prior to paving. “There’s a science to soils,” Crovetti says. “Some of our neighboring states have made strides in adopting these types of tests to ensure optimal pavement design, construction and performance.

“The public is best served by strong and durable pavements,” Crovetti adds. “Contractors can deliver these quality pavements when they have the right tools and information to allow them to go into a job with their eyes wide open. Some contractors may be hesitant to use these tools at first, but those that have often find that these tools made their lives easier in the long run.” ■

Device	Falling Weight Deflectometer	Light Weight Deflectometer	Dynamic Cone Penetrometer
			
Ballpark cost to own	\$150,000	\$15,000	\$1,500
How it works	A heavy weight is dropped on a flat plate resting against the ground or pavement. The resulting deflection correlates with subsurface stiffness. The FWD is typically mounted on a vehicle or trailer.	The principle is similar to the FWD, but as the name suggests, a lighter weight is used.	A weighted hammer is dropped and a rod is driven into the soil; the depth of penetration is used to estimate soil strength.
Why use it?	It can be used directly on the subsoil or on a pavement. The heavy weight allows measurement deep into the ground. WisDOT uses this device.	The LWD is portable and lightweight. It too can be used directly on the subsoil or on a pavement. It measures stiffness about one-third of a meter deep.	The DCP is also portable and lightweight. It measures strength of unbound layers down to a meter below the testing surface.
But keep in mind ...	This is an expensive piece of equipment. Fortunately, these can be contracted out for use by vendors across the state.	Due to its lighter weight, the LWD measures a smaller sample of ground than the FWD.	The DCP can give false readings if it hits a cobble as it penetrates the ground, indicating that the base is stiffer than it really is. Also, the DCP requires coring of a pavement (if present) to measure the unbound layer properties.

(Images courtesy of Pavement Consultants and Kessler)



MEMO

From: WAPA
To: Pavement management engineers in Wisconsin
Subject: **FINE-TEXTURE MILLING PROVIDES
EXTRA LIFE BEFORE THE NEXT REHAB**

The problem: Your pavement isn't due for major rehabilitation for another five years, but you know that it just isn't performing the way it needs to today. Perhaps the surface has been worn too smooth, and during heavy rainfall it becomes a hydroplaning hazard to motorists. Or possibly excessive rutting is resulting in standing water in the wheel paths.

Your first priorities are to maintain safety and performance, but you can't ignore the issue of cost either. Does it really make sense to mill and overlay when a major reconstruction is just around the corner?

Decisions, decisions.

The possible solution: The asphalt you need might be right under your feet—less than an inch below that problematic surface. In a process called fine-texture milling, a pavement milling machine can remove as little as three-eighths of an inch of the pavement. Unlike a typical mill-and-fill operation, though, there isn't the additional step in laying a new wearing course after milling has been completed. Instead, the surface newly exposed by the milling process will already have the desired final texture, contour and noise properties and will be ready for traffic. The process is easily achieved with a fine-tooth milling drum meeting an 8-mm tooth spacing specification.

This solution is extremely cost-effective, carrying virtually no costs for paving materials. Moreover, the shallow milling depth results in very minimal waste material to remove and recycle. Most importantly, it can help you buy the time you need until the next scheduled reconstruction.

Fine-texture milling in action: This smart idea is not a new one. The Wisconsin Department of Transportation conducted several projects like this in the 1990s, and the concept has recently made its return. This fall, Payne & Dolan undertook a fine-texture milling project along a three-mile section of I-43 near Mequon in Ozaukee County. It should be completed in October 2010. Payne & Dolan's Tony Bodway says, "This project makes sense for everyone involved: The public gets a much improved riding surface; the state is able to deliver this improved surface based upon the limited funds available; and we, the contractor, can do it with equipment we already own."

For more information on fine-texture milling, please contact WAPA.

(Images courtesy of Payne & Dolan)

Asphalt Remains the Right Choice

It's easy to be happy with an asphalt pavement when it is new—the smooth and unblemished surface, the crisp bright lines on a black roadway.

But how that pavement performs over time tells the real story. We decided to check on an HMA replacement project that we wrote about in 2007 to see if the owner was still as happy after three years of traffic and three Wisconsin winters of abuse.

In the Fall 2007 issue of *Wisconsin Asphalt News*, we described the Watson Street pavement replacement project that had just been completed along three blocks of downtown Ripon. In just three days, contractor Northeast Asphalt performed a full-depth (4½-inch) removal of the existing 28-year-old pavement and laid nearly 1,800 tons of asphalt. The job featured two pavers operating in echelon, which provided a hot center joint and a virtually unnoticeable centerline.

At the time, city engineer Travis Drake remarked that he was very happy with the job and said, “If given the need to do a project similar to this one, I would definitely do it the same way again.”

So now, three years later, would he still choose this method?

WAPA asked Drake, who is still Ripon's city engineer, if he could provide any fresh perspective.

“I've hardly had to give that road a second thought,” Drake says. “When a road does what it's supposed to do, you tend to forget about it. It's in beautiful shape and in like-new condition.”

Drake is convinced of the benefits of asphalt pulverization for replacement projects. “In our experience,” he says, “pulverizing and paving is a very effective method to combat reflective cracking.” As further evidence, he cites a residential project conducted 12 years ago in Ripon that featured pulverization and repaving. Drake says, “Even today, that pavement is still in great shape with very minimal cracking.” Based on the success of these and other asphalt projects, Ripon repaved a thousand feet of another street in 2008 by pulverizing and repaving.

So we're marking down the Watson Street replacement project in Ripon as a success story. We are always happy when a story ends well. And with many more years of high performance expected out of that pavement, it is particularly gratifying when the story *continues* to end well. ■

It Pays to Compare

When it comes to pavement selection, it is never just about the money. Still, the immediate and long-term costs of a project need to be considered along with performance and environmental benefits.

To make the most of its budget, the city of Fond du Lac uses alternate bidding for its pavement projects, comparing asphalt and concrete bids side by side. Mark Lentz, Director of Public Works for Fond du Lac, says, “We turned to alternate bidding 20 years ago for pavement projects funded primarily by city dollars. This approach has proven very effective in getting Fond du Lac the best value for the money.”

An important part of the equation is life-cycle cost analysis. Lentz says, “After bids come in, we apply industry-accepted LCCA procedures for asphalt and concrete alike to make sure we're accounting for all costs in our comparisons, including maintenance and rehabilitation costs.”

How do the two types of pavement compare? “For city-funded projects, we select asphalt the majority—if not the vast majority—of the time,” says Lentz. “That explains why so many streets in Fond du Lac, regardless of the classification, are asphalt.”

Lentz is satisfied with the alternate bidding process now in place. “Alternate bidding makes pavement selection a fair and equitable process for all parties, and, most importantly, helps us make the most of our budget.”

Lentz frequently answers questions from Wisconsin road agencies about Fond du Lac's alternate bidding process. WAPA also stands ready to assist local Wisconsin governments interested in alternate bidding. For more about LCCA, see the [Fall 2008 issue of Wisconsin Asphalt News](#). ■



Three years later, downtown Ripon's asphalt replacement keeps delivering trouble-free performance.

Asphalt: High-Speed Rail Rides on It, Too



(Image courtesy of Midwest High Speed Rail Association)

Early this year the Federal Railroad Administration awarded WisDOT \$810 million to construct the Milwaukee-to-Madison segment of the high-speed passenger rail network that will connect nine Midwestern states. As WisDOT describes on the [project's Web page](#), construction of rail stations along the Milwaukee-Madison corridor will begin in 2012, and service is scheduled to start in 2013.

And just as asphalt makes for high-performance roadways, it can also be a key ingredient in high-performance railways. To enhance trackbed strength and improve system performance, an asphalt layer can underlay and support ballast in a railway trackbed or it can replace the ballast under the tracks entirely. (See the diagrams above right.)

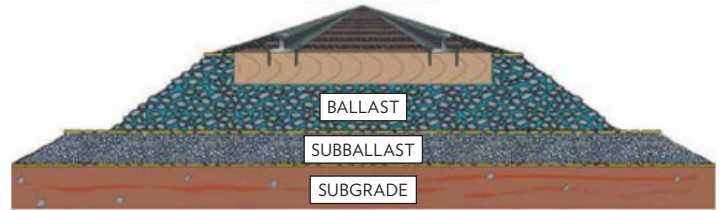
University of Kentucky Professor Jerry Rose is an expert on this practice and has been studying its expanded use. "The use of asphalt in railway trackbeds is already well-known around the world, in Europe and Asia as well as some rail lines

here in the United States," says Rose.

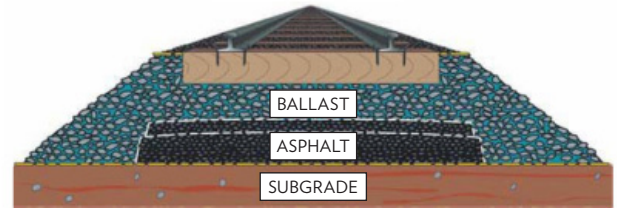
Rose describes some deployments in his article "Asphalt's Stake in Railroad-ing" in *Hot Mix Asphalt Technology* (March/April 2010). He lists a number of benefits to supporting rail lines with asphalt:

- Asphalt provides strength below the tracks and uniformly distributes and reduces pressure to the roadbed or subgrade.
- Asphalt acts as a waterproof layer, improving the stability and load-carrying capacity of track structures. It also diverts water to side ditches, eliminating fluctuations in roadbed moisture.
- Asphalt is resilient, which helps protect the roadbed without substantially increasing track stiffness.

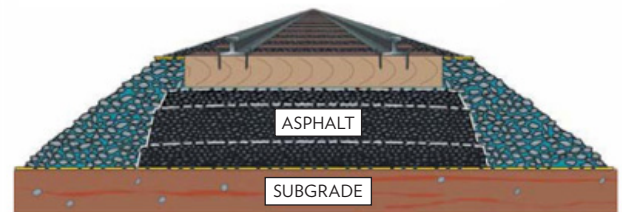
Asphalt might just be the perfect fit for the Milwaukee-Madison high-speed rail corridor. WAPA is working with the state, contractors and Professor Rose to see how to



BALLASTED TRACKBED



UNDERLAYMENT ASPHALT



OVERLAYMENT [FULL-DEPTH] ASPHALT

A typical ballasted trackbed (top) compared with one improved with underlayment asphalt (middle) and full-depth overlayment asphalt (bottom). (Image courtesy of Hot Mix Asphalt Technology magazine)

incorporate this technology in WisDOT's major undertaking. This is an excellent opportunity to evaluate both the underlayment and the full-depth overlayment treatments, which in addition to their other benefits reduce the total trackbed depth significantly compared with the traditional ballasted approach. Check back with WAPA for developments on this topic in the coming weeks and months. ■

To Recovery and Beyond

Lawmakers often have a thankless task. Funding is limited, and there are as many different opinions on how to spend tax dollars as there are constituents.

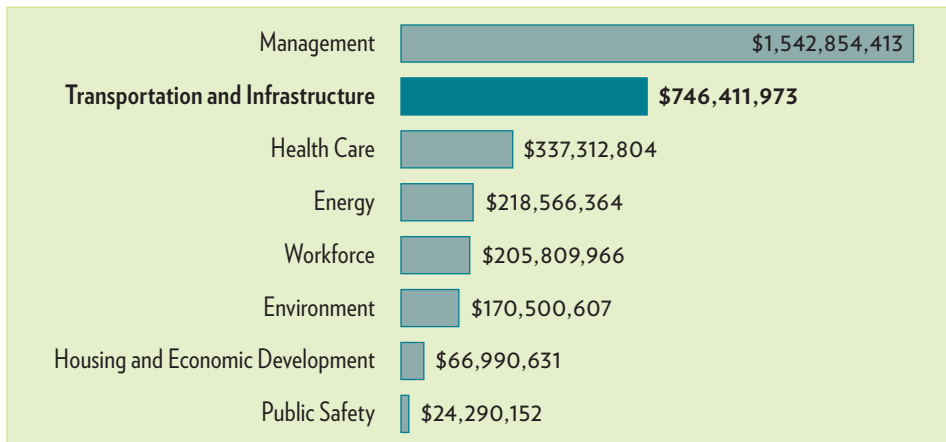
So we should break from tradition and first offer a thanks to our lawmakers, here in Wisconsin and across the country as well, for passage of the American Recovery and Reinvestment Act.

According to the state of Wisconsin's Office of Recovery and Reinvestment, through August 31, 2010, almost \$750 million in recovery funds in Wisconsin have gone toward transportation and infrastructure—second behind education,

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To Recovery and Beyond

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Where ARRA money is going, according to Wisconsin's [Money Tracker](#).
(Image courtesy of [recovery.wi.gov](#))

with health care a distant third.

This kind of spending on transportation supports what we all know to be true: Transportation is vital to Wisconsin's economy and the nation's. It keeps goods and workers moving. It means jobs in building and maintaining roads. And asphalt pavements play a pivotal role.

The [Asphalt Pavement Alliance](#) recently published a white paper, [Jobs in the Asphalt Pavement Industry: A Profile of the Men and Women Who Build Our Nation's Infrastructure](#). The paper presents some impressive numbers about the national impact of the asphalt pavement industry:

- **67,367** people are employed by refiners producing liquid asphalt.
- **117,000** are employed in the aggregates industry.
- **14,923** are directly employed in asphalt mix production.
- **410,000** are employed in the construction of highways, streets, runways, roads and bridges.
- **30,000** jobs are created for every \$1 billion of federal investment.
- **\$6.2 billion** in economic activity is generated for every \$1 billion invested in federal highways.

A great deal is at stake when it comes to the well-being of the asphalt pavement industry. So we ask the ques-

tion: Is the federal stimulus approach the right way to keep things going forward?

A recent report from the U.S. Government Accountability Office, [Opportunities to Improve Management and Strengthen Accountability over States' and Localities' Uses of Funds](#), offers some information that gives us pause. For starters, at a national level, among \$25.6 billion obligated for 12,300 highway projects, only \$11.1 billion (or 44 percent) has been reimbursed to states. In addition, 21 states have shifted ARRA highway funds to transit, including funding operating expenses, subverting the Recovery Act's goal of creating or preserving jobs with new capital projects.

Perhaps most importantly, the study found that obligations and reimbursement of regular FHWA formula funds slowed during the Recovery Act period. The goal of ARRA was to be a one-time shot in the arm, not to replace regular federal highway funding. The American Road & Transportation Builders Association agrees; in [a letter](#) to President Obama, ARTBA makes the case for authorization of a six-year, \$500 billion highway bill and spells out the dire consequences if steps in this direction are not taken soon. More than ever, reauthorization is what the country needs. ■



Mission

Promote quality hot mix asphalt pavements which are safe, efficient and in the best interest of the customer.

Vision

Professionals dedicated to making HMA the customer's preferred choice in pavement solutions through innovation, education and exceptional service.

Values

- * STEWARDSHIP
- * EXCELLENCE
- * INNOVATION
- * PROFESSIONALISM
- * ACCOUNTABILITY

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Sustainability by the Numbers

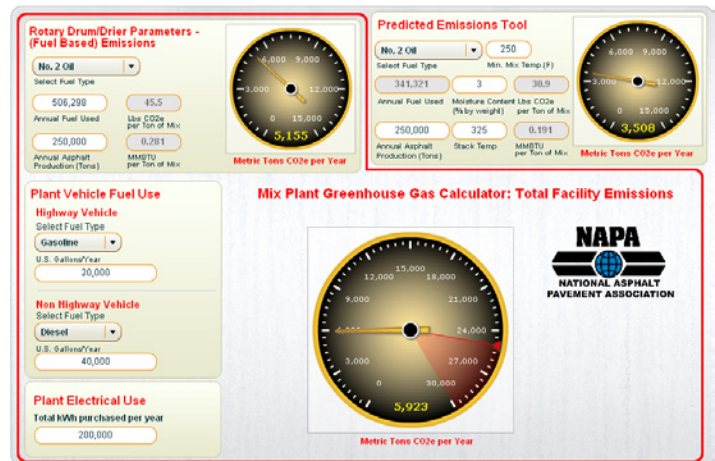
Calculating the Green Benefits of Asphalt

Sustainability isn't just a national issue. Or a state issue. The **ICLEI – Local Governments for Sustainability**, an association committed to advancing climate protection and sustainable development, comprises more than 600 local governments. Wisconsin members of ICLEI include Fitchburg, Howard, Madison, Marshfield, Milwaukee, Oshkosh and Racine.

This summer the village of Howard joined Madison in earning an ICLEI Sustainability Milestone Award. Howard achieved this milestone by calculating and forecasting greenhouse gas emissions from all municipal operations and community-related activities. It is an important step toward meeting the village's Energy Action Plan to reduce emissions 25 percent by 2020 and to

transfer 25 percent of energy use to renewable sources by 2025.

To reach those goals, Howard will need to employ every emissions- and energy-saving strategy in the book. For that, WAPA reminds Howard and all sustainability-minded governments that asphalt is the green pavement—and it is getting greener all the time. As we discussed in the **Fall 2009 issue of Wisconsin Asphalt News**, warm-mix asphalt allows production of asphalt at lower temperatures, reducing fuel combustion requirements and lowering greenhouse gas emissions. We also talked about the energy and emissions savings of asphalt recycling (see the **Summer 2008** issue), including vehicle fuel saved by in-place recycling of asphalt pavements.



What's the impact of these approaches? The National Asphalt Pavement Association is helping communities understand and quantify the emissions savings of asphalt with its Web-based **Greenhouse Gas Calculator**. User inputs to the calculator include plant electricity, plant heating fuel and vehicle fuel requirements. The calculator's output is simple: yearly emissions of carbon dioxide

equivalent in metric tons. For a community seeking the impact of new asphalt approaches, the calculator is a real eye-opener.

The story on sustainability doesn't end there. New technologies are continuing to emerge to make asphalt greener at the plant and on the construction site. Look for feature stories in coming newsletter issues to learn more. ■

ALL ROADS LEAD TO THE BADGER STATE Wisconsin's World-Renowned Research Expertise

Over the course of two weeks in September, Madison showcased its technology leadership on asphalt to experts from around the world. First, the University of Wisconsin–Madison and the University of Texas co-hosted the **International Workshop on Asphalt Binders and Mastics** at UW–Madison. The event was sponsored by FHWA, the International Society for Asphalt Pavements and UW–Madison's **Modified Asphalt Research Center**.

This workshop was followed by meetings on the UW campus by FHWA's **Expert Task Groups** on binders, mixtures and modeling. Also convening at UW were two technical committees of the International Union of Laboratories and Experts in Construction Materials, Systems and Structures—or RILEM—to address advanced testing and

characterization of bituminous materials (**Technical Committee 206**) and cracking in asphalt pavements (**Technical Committee 210**).

Wisconsin's asphalt industry and the millions of travelers in the state directly benefit from the asphalt advances happening at UW–Madison and other research facilities in the state. We are fortunate to have them, and we certainly forgive the envy of our recent national and international visitors. ■



Máquina Fountain in front of UW–Madison's Engineering Hall and asphalt laboratories. (Image courtesy of UW–Madison)

Welcome New Members!

R.H. Batterman & Co., Inc. of Beloit provides transportation services in design, inspection and construction management for state, municipal and private sector clients in southern Wisconsin and northern Illinois.

Custom Welding & Metal Fab, Inc. of Waite Park, Minnesota, is a manufacturer of asphalt and aggregate plant equipment.

HNI Risk Services of New Berlin is a commercial property, casualty, bonding and employee benefit brokerage with a focus on construction and transportation.

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YAHARA MATERIALS